

Confirmation No. 7528

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	HAISMA	Examiner:	Langman, J.
Serial No.:	10/539,260	Group Art Unit:	1794
Filed:	June 15, 2005	Docket No.:	NL021443US1 (NXPS.513PA)
Title:	STRESS-FREE COMPOSITE SUBSTRATE AND METHOD OF MANUFACTURING SUCH A COMPOSITE SUBSTRATE		

APPEAL BRIEF

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Dear Sir:

This Appeal Brief is submitted pursuant to 37 C.F.R. §41.37, in support of the Notice of Appeal filed November 9, 2009 and in response to the rejections of claims 1-10 and 21-28 as set forth in the Final Office Action dated September 3, 2009.

Please charge Deposit Account number 50-4019 (NL021443US1) \$540.00 for filing this brief in support of an appeal as set forth in 37 C.F.R. §1.17(c). If necessary, authority is given to charge/credit Deposit Account 50-0996 additional fees/overages in support of this filing.

I. Real Party In Interest

The real party in interest is NXP Semiconductors. The application is presently assigned of record, at reel/frame nos. 021085/0959 to NXP, B.V., headquartered in Eindhoven, the Netherlands.

II. Related Appeals and Interferences

While Appellant is aware of other pending applications owned by the above-identified Assignee, Appellant is unaware of any related appeals, interferences or judicial proceedings that would have a bearing on the Board's decision in the instant appeal.

III. Status of Claims

Claims 1-10 and 21-28 stand rejected and are presented for appeal. Claims 11-20 have been cancelled. A complete listing of the claims under appeal is provided in an Appendix to this Brief.

IV. Status of Amendments

No amendments have been filed subsequent to the Final Office Action dated September 3, 2009.

V. Summary of Claimed Subject Matter

As required by 37 C.F.R. § 41.37(c)(1)(v), a concise explanation of the subject matter defined in the independent claims involved in the appeal is provided herein. Appellant notes that representative subject matter is identified for these claims; however, the abundance of supporting subject matter in the application prohibits identifying all textual and diagrammatic references to each claimed recitation. Appellant thus submits that other application subject matter, which supports the claims but is not specifically identified above, may be found elsewhere in the application. Appellant further notes that this summary does not provide an exhaustive or exclusive view of the present subject matter, and Appellant refers to the appended claims and their legal equivalents for a complete statement of the invention.

Commensurate with independent claim 1, an example embodiment of the present invention is directed to a composite substrate comprising: a carrier composed of a carrier

material (*see, e.g.*, Fig. 5 and page 3:15), the carrier having a surface and pillar extensions that extend from the surface (*see, e.g.*, Fig. 5 and page 3:20-22), the pillar extensions having rounded corners that meet the surface of the carrier (*see e.g.*, Fig. 5 and page 5:5-7), the rounded corners forming a gradual interface between sidewalls of the pillar extensions and the surface of the carrier (*see id.*); a first layer composed of a first material having a dilatation behavior that is substantially the same as that of the carrier material (*see, e.g.*, Fig. 5, page 1:2 and page 3:5-7); and an intermediate layer composed of a second material being located between the carrier and the first layer (*see, e.g.*, Fig. 5), the second material having a dilatation mismatch with the first material (*see e.g.*, page 3:7-8), the intermediate layer having pillar structures of the second material (*see, e.g.*, Fig. 5 and page 3:7-11), each extending from one of the pillar extensions to a surface of the first layer (*see, e.g.*, Fig. 5), and arranged for absorbing stress originating from the dilatation mismatch (*see, e.g.*, page 3:7-11), and wherein the rounded corners of the pillar extensions reduce stress originating from the dilatation mismatch (*see, e.g.*, Fig. 5 and page 5:7).

VI. Grounds of Rejection to be Reviewed Upon Appeal

The grounds of rejection to be reviewed on appeal are as follows:

- A. Claims 1-10 and 21-28 stand rejected under 35 U.S.C. § 102(b) over the Habberger reference (U.S. Patent No. 6,417,075).
- B. Claims 9 and 27 stand rejected under U.S.C. § 103(a) over the '075 reference.

VII. Argument

Generally, the §§ 102 and 103 rejections fail to establish correspondence to the claimed invention, and aspects of the cited references teach away from the assertions made in the (final) Office Action. The Office Actions of record, as well as the Advisory Action, misconstrue various aspects of the prior art. The Office Action's use of inherency arguments fails to consider the '075 reference as a whole as required under the M.P.E.P. and relevant case law. *See e.g.*, M.P.E.P. § 2141.02. The Office Actions of record also appear to have completely ignored Appellant's arguments regarding lack of a product by process step in claim 24, which now stands uncontested in the record. Accordingly, Appellant believes that all rejections are improper for failing to establish correspondence to the claimed invention.

The following addresses this lack of correspondence in greater detail, as well as the Examiner's misinterpretation of the cited reference.

**A. The § 102(b) Rejection of Claims 1-10 and 21-28 Has Failed
To Establish Correspondence To the Claimed Invention.**

As consistent with Appellant's traversals of record, the '075 reference fails to disclose various limitations including those directed to a carrier having a surface and pillar extensions that extend from the surface, with the pillar extensions having rounded corners that form a gradual interface between the sidewalls of the pillar extensions and the surface of the carrier. The Examiner erroneously asserts that the '075 reference teaches such aspects of the claimed invention despite the fact that the '075 reference does not support such assertions. In particular, the Examiner improperly relies upon Col. 7:35-40 of the '075 reference, which does not concern the interface between the sidewalls of channels 5 and the surface of the substrate, but instead teaches that the shape and structure of the lateral extension of the channels 5 can be rectangular, round, meandering or polygon-type. *See, e.g.*, Col 7:28-40. As such, Col. 7:35-40 of the '075 reference does not provide any support for the Examiner's erroneous assertion that the '075 reference teaches rounded corners forming a gradual interface, as in the claimed invention.

**1. The § 102(b) Rejection Of Claims 1-10 And 21-28
Is Improper Because The Examiner Has Misinterpreted
The Teachings Of The '075 Reference.**

Appellant traverses the § 102(b) rejection of claims 1-10 and 21-28 because the '075 reference does not correspond to aspects of the claimed invention directed to a carrier having a surface and pillar extensions that extend from the surface, the pillar extensions having rounded corners that form a graduate interface between the sidewalls of the pillar extensions and the surface of the carrier. The Examiner apparently confuses the unrelated teachings of the '075 reference directed to the different cross-sectional shapes of the channels 5 (as shown by the four example cross-sections at the bottom of Figure 3) with the example shapes of the lateral extension of the channels 5. *See, e.g.*, Col. 7:36-38 and Col. 7:45-48. The example structures of the lateral extension of the channels 5 (*e.g.*, rectangular, round, meandering or

polygon-type) are not referring to the cross-sectional shapes of the channels 5 shown in Figure 3 and relied upon by the Examiner. Appellant submits that it would be clear to the skilled artisan that the example shapes of the lateral extension of the channels 5 are referring to the lateral extension of the channels and not to the cross-sectional shapes of the channels 5 shown in Figure 3.

The language surrounding the listing of exemplary shapes of the channels 5 supports the Appellant's reading and teaches away from the Examiner's assertions. Specifically, in Col 7: 28-35, the '075 reference discusses ensuring the efficient transfer of the etching agent based on the lateral extension of the channels 5 for proper detachment of the integrated circuit. In the following paragraph the examples cited by the Examiner are introduced and the '075 reference states "Exemplary shapes of the channels in both substrates are rectangular structures, round, meandering or polygon-type structures. The structure should . . . render the detaching process as simple and rapid as possible." Col 7:35-41. "Cross-sectional shapes" is introduced after the discussion of the lateral extension and the sole mention of the round structure. Further, it is unclear to Appellant how the cross-sectional shapes of the channels 5 could be meandering or even round. However, Appellant easily envisions a wafer 2 as shown in Figure 3 where the channels form a meandering or round structure on the surface of wafer 2. Appellant submits that, based on the language of the '075 reference, it would be clear to the skilled artisan that the example shapes of the lateral extension of the channels 5 are not referring to the cross-sectional shapes of the channels 5 shown in Figure 3. Accordingly, the Examiner has improperly based the rejections on a misinterpretation of the '075 reference.

In view of the above, the § 102(b) rejection of claims 1-10 and 21-28 is improper and Appellant requests that it be reversed.

2. The § 102(b) Rejection Of Claims 1-10 And 21-28 Is Improper Because The Asserted Correspondence Is Improperly Based Upon An Inherent Feature Not Present In The '075 Reference.

Appellant further traverses the § 102(b) rejection of claim 1-10 and 21-28 because the asserted correspondence is improperly based on an asserted inherent feature within the '075 reference. The Examiner uses these improper assertions of inherence in an attempt to

establish correspondence to the claim limitation regarding rounded corners on the pillar extensions. For example, the Examiner erroneously asserts that the trenches of the '075 reference are formed "by the same process as instantly claimed (selective patterning with photolithography and then wet or dry etching), and therefore are expected to have the same structural features as instantly claimed." There is no indication in the cited reference, nor in the Appellant's specification, that selective patterning with photolithography and then wet or dry etching must result in rounded corners as asserted by the examiner. Further, the Examiner's assertion that "rounded corners naturally occur during forming the structures through wet etching" is directly contradicted by the '075 reference. For example, where the '075 reference teaches that structures can be formed into the substrate (*i.e.*, the asserted pillar extensions), these structures are taught by the '075 reference as not having rounded corners as shown in the blow-up of the channels 5 in Figure 3. *See also* Col. 7:44-48. The '075 reference further expressly teaches that the recesses/channels 5 that are formed in the oxide 3 can meet the surface at the wafer at an angle of 90° (among other orientations), which do not result in rounded corners. *See, e.g.*, Figure 3, Col 4:40-53, Col. 7:5-8 and Col. 7:44-48. Thus any assertion of inherency with regard to the '075 reference teaching rounded corners would be improper. *See, e.g.*, M.P.E.P. § 2112. Further, the Examiner's attempt to rely upon another reference (US 2001/0023960) to support the assertion regarding wet etching is improper due to the fact that the '075 reference expressly teaches that its etching does not necessarily result in rounded corners. The rejections presented in the Office Action are improperly based on mere speculation by the Examiner that the claimed aspects are possible, and the speculation is directly contradicted by the '075 reference.

In view of the above, the § 102(b) rejection of claims 1-10 and 21-28 is improper and Appellant requests that it be reversed.

3. The § 102(b) Rejection Of Claim 24 Is Improper Because The '075 Reference Lacks Correspondence.

Appellant further traverses the § 102(b) rejection of claim 24 because the '075 reference does not correspond to aspects of the claimed invention directed to the second material being thermally oxidized semiconductor material. The Examiner erroneously bases

the rejection of claim 24 on “product by process case law” when no product by process limitations are present in claim 24. Appellant points out that claim 24 recites what the second material is (*i.e.*, thermally oxidized semiconductor material). Further, assuming *in arguendo* claim 24 is claiming a semiconductor oxide layer formed through thermal oxidation as asserted by the Office Action, the Office Action fails to consider the structure implied by the asserted process as required under M.P.E.P. § 2113. (“The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product.”). By equating the specific material with a product by process step, the Office Action has improperly ignored these aspects of claim 24, which are not taught by the ‘075 reference. Specifically, thermal oxidation results in a thin layer of oxidation only a few atomic layers thick on the surface of the semiconductor material. Conversely, the oxidation layer in ‘075 reference is roughly 1 μm thick. A 1 μm thick oxidation layer is on the order of 1000x thicker than an oxidation layer formed through the thermal oxidation process. Therefore, the Examiner has failed to establish correspondence to the limitation of a thermally oxidized semiconductor material.

In view of the above, the § 102(b) rejection of claim 24 is improper and Appellant requests that it be reversed.

B. The § 103 (a) Rejection Of Claims 9 And 27 Is Improper Because The ‘075 Reference Lacks Correspondence And Because The Examiner Relies On An Improper Obvious To Try Argument.

1. The § 103(a) Rejection Of Claims 9 And 27 Is Improper Because The ‘075 Reference Lacks Correspondence.

The § 103 rejection of claims 9 and 27 is improper because the cited reference does not correspond to the claimed invention as discussed above under heading A. Appellant notes that there is no additional reference cited to overcome the above discussed deficiencies of the ‘075 reference. The asserted obviousness also does not overcome the deficiencies.

For at least these reasons, the §103 rejection of claims 9 and 27 is improper since these claims depend from claim 1.

**2. The § 103(a) Rejection Of Claims 9 And 27
Is Improper Because The Examiner Relies
On An Improper Obvious To Try Argument.**

The § 103 rejection of claims 9 and 27 is improper because the Examiner relies on an obvious to try argument in asserting the claims are obvious based on the '075 reference alone. However, the "obvious to try" standard may not be applied when one would have to "vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which of many possible choices is likely to be successful." *In re Kubin* (Fed. Cir. April 3, 2009) *interpreting KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007); *see also* M.P.E.P. §2141. The Examiner has asserted that although the '075 reference "does not mention the exact sizes and shapes as instantly claimed . . . it would obvious . . . to choose any desired pattern including those shapes and sizes instantly claimed, as these are shown to be desired effective results." The Examiner has failed to show any indication in the '075 reference of a goal towards which one of ordinary skill in the art would work before ceasing experimentation, in order to reach "the desired effective results" or "optimum" results. Without a goal, not only would reaching the desired results require varying all the parameters from an endless number of possibilities, but one of skill in the art would not attempt or be assigned such an open-ended and undefined endeavor. A skilled artisan does not perform repeated experiments in the hopes of reaching some optimum without having a stated goal or parameter in which they are attempting to optimize. It appears the Examiner is improperly relying on the Appellant's disclosure to provide the goal. Therefore, the 103(a) rejection is improper under case law and the M.P.E.P..

In view of the above, Appellant requests that the § 103 rejection of claims 9 and 27 be reversed.

VIII. Conclusion

In view of the above, Appellant submits that the rejections of claims 1-10 and 21-28 are improper and therefore requests reversal of the rejections as applied to the appealed claims and allowance of the entire application.

Authority to charge the undersigned's deposit account was provided on the first page of this brief.

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APPENDIX OF CLAIMS INVOLVED IN THE APPEAL
(S/N 10/539,260)

1. A composite substrate comprising:
 - a carrier composed of a carrier material, the carrier having a surface and pillar extensions that extend from the surface, the pillar extensions having rounded corners that meet the surface of the carrier, the rounded corners forming a gradual interface between sidewalls of the pillar extensions and the surface of the carrier;
 - a first layer composed of a first material having a dilatation behavior that is substantially the same as that of the carrier material; and
 - an intermediate layer composed of a second material being located between the carrier and the first layer, the second material having a dilatation mismatch with the first material, the intermediate layer having pillar structures of the second material, each extending from one of the pillar extensions to a surface of the first layer, and arranged for absorbing stress originating from the dilatation mismatch, and wherein the rounded corners of the pillar extensions reduce stress originating from the dilatation mismatch.
2. A composite substrate according to claim 1, wherein the intermediate layer has a thickness, and the structures extend through the thickness of the intermediate layer.
3. A composite substrate according to claim 1, wherein the pillar structures are separated by open spaces that extend from the surface of the carrier to the surface of the first layer.
4. A composite substrate according to claim 1, wherein the carrier material is the same as the first material.
5. A composite substrate according to claim 1, wherein the carrier material and the first material are semiconductors.

6. A composite substrate according to claim 1, wherein the second material is an electrically insulating material.
7. A composite substrate according to claim 1, wherein the intermediate layer lies in a plane, and wherein the dimensions of the structures in the plane of the intermediate layer are less than a centimeter.
8. A composite substrate according to claim 1, wherein the carrier lies in a plane and wherein the structures have a line-symmetric shape in a cross-section perpendicular to the plane of the carrier.
9. A composite substrate according to claim 1, wherein the carrier lies in a plane and wherein the structures have a circular, square, rectangular or rhombic shape in a cross-section parallel to the plane of the carrier.
10. A composite substrate according to claim 1, wherein the composite substrate is a silicon-on-insulator wafer.
21. A composite substrate according to claim 1, wherein the first layer is bonded to the intermediate layer.
22. A composite substrate according to claim 1, wherein the carrier material is a semiconductor and the second material is composed of an oxide of the semiconductor.
23. A composite substrate according to claim 1, wherein the structures are formed integrally with the carrier layer.
24. A composite substrate according to claim 1, wherein the second material is thermally oxidized semiconductor material.

25. A composite substrate according to claim 1, wherein each of the structures has a free surface arranged so that dislocations that form in the structures due to the stress originating from the dilatation mismatch move to and disappear from the free surface.
26. A composite substrate according to claim 1, wherein the structures are included at selected locations of the intermediate layer.
27. A composite substrate according to claim 1, wherein the pillar structures each have a diameter of between 10 μm and 10 nm.
28. A composite substrate according to claim 1, wherein the first layer includes a device layer.

APPENDIX OF EVIDENCE

Appellant is unaware of any evidence submitted in this application pursuant to 37 C.F.R. §§ 1.130, 1.131, and 1.132.

APPENDIX OF RELATED PROCEEDINGS

As stated in Section II above, Appellant is unaware of any related appeals, interferences or judicial proceedings.